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Adapting Daubechies' Wavelet Iteration Scheme to Biorthogonal Scaling Functions

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Oral Presentation 2.2

ADAPTING DAUBECHIES' WAVELET ITERATION SCHEME TO BIORTHOGONAL SCALING FUNCTIONS

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In 1988 Daubechies developed an iteration scheme to produce a D4 wavelet function which has since become very popular. This iteration scheme is based upon four conditions stated by Daubechies. One of these conditions required that the scaling function be orthogonal. We propose a new iteration scheme, similar in nature to Daubechies', but with a relaxed orthogonality condition. Our iteration scheme does not require that the scaling function be orthogonal, but only that it be biorthogonal. With this orthogonality condition relaxed, we can construct a dual of an unorthogonal function by using macroelement analysis, and thus create a larger set of possible initial functions for the iteration scheme. This new iteration scheme is then able to produce biorthogonal wavelet functions, a much broader group than that produced by Daubechies' iteration scheme. As an example we use the second order B-spline, commonly known as the hat function, as an initial function of our iteration scheme.